Evaluation of Fever in Deployed Troops

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Outline

- Fever
- Challenges
- Evaluation of febrile syndromes
  - Fever with rash
  - Fever with respiratory symptoms
  - Fever with neurologic symptoms
  - Fever with gastrointestinal symptoms
  - Fever with eosinophilia
  - Undifferentiated fever
- Historical Experience
- Conclusions

Fever

- Definition of fever
  - No good consensus on what a “fever” is
  - IDSA practice guidelines contain different definitions of fever for different conditions
    - Febrile neutropenia:
      - ≥101 °F (38.3 °C) once *or* ≥100.4 °F (38 °C) for ≥1 hour
    - Critically ill patients:
      - ≥101 °F (38.3 °C)

Fever

- Many factors affect normal body temperature
  - Measurement method
  - Age (Kids are warmer and elderly are cooler)
  - Sex (Females are warmer than males)
  - Race (Blacks are warmer than whites)
  - Time of day (Evenings are warmer than mornings)

Fever

- For the purpose of evaluating fever in deployed troops, could use ≥100.4 °F as a good cut-off
- Presence of chills, rigors, night sweats, or weight loss should prompt an evaluation regardless of temperature
- Pattern of fever is rarely helpful

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Challenges of Evaluation

- Unfamiliar local diseases
  - Know the epidemiology of your area and illnesses affecting previous operations
- Fear of punishment
  - Malaria
  - Food and water-borne illnesses
  - STDs
- Facility limitations
  - BAS < CSH < MEDCEN
  - Know your facilities lab / rad / pharmacy capabilities

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Fever with rash

- Differential diagnosis:
  - Bacterial infections:
    - Meningococcemia
    - Disseminated gonococcal infection
    - Toxic Shock Syndrome
  - Rickettsial infections: (i.e. spotted fevers)
    - Scrub typhus
    - Mediterranean tick typhus
    - African tick typhus
  - Spirochetal infections:
    - Secondary syphilis
    - Leptospirosis
    - Lyme Disease

Meningococcemia

Fever with rash

- Differential diagnosis:
  - Viral infections:
    - Dengue
    - Other viral hemorrhagic fevers
      - Crimean-Congo, Ebola, Marburg, Lassa, Rift Valley, etc...
    - EBV Mononucleosis
      - Esp. after amoxicillin
    - Acute retroviral syndrome
  - Non-infectious causes:
    - Drug reactions

Dengue rashes:

Petechial

Erythroderma

Maculopapular

Fever with rash

- Evaluation:
  - CBC with differential
  - Chemistry / LFTs / UA
  - Blood cultures
  - RPR, Monospot, HIV ELISA and VL
  - Serologies (for future answers…)
    - Leptospirosis, Dengue, Rickettsia
  - LP?

Fever with rash

- Initial therapy:
  - Ceftriaxone if meningococcemia suspected
  - Remove any closed wound packings/tampons if TSS suspected and treat with vancomycin (staphylococcal) or penicillin/clindamycin (streptococcal)
  - Tetracycline/Doxycycline for rickettsial illnesses
  - Supportive therapy for viral illnesses

off the mark
by Mark Parisi
www.offthemark.com
THERE YOU GO AGAIN... EVERY TIME I WANT TO TALK, YOU GO AND BURY YOUR HEAD!
TICK RELATIONSHIPS

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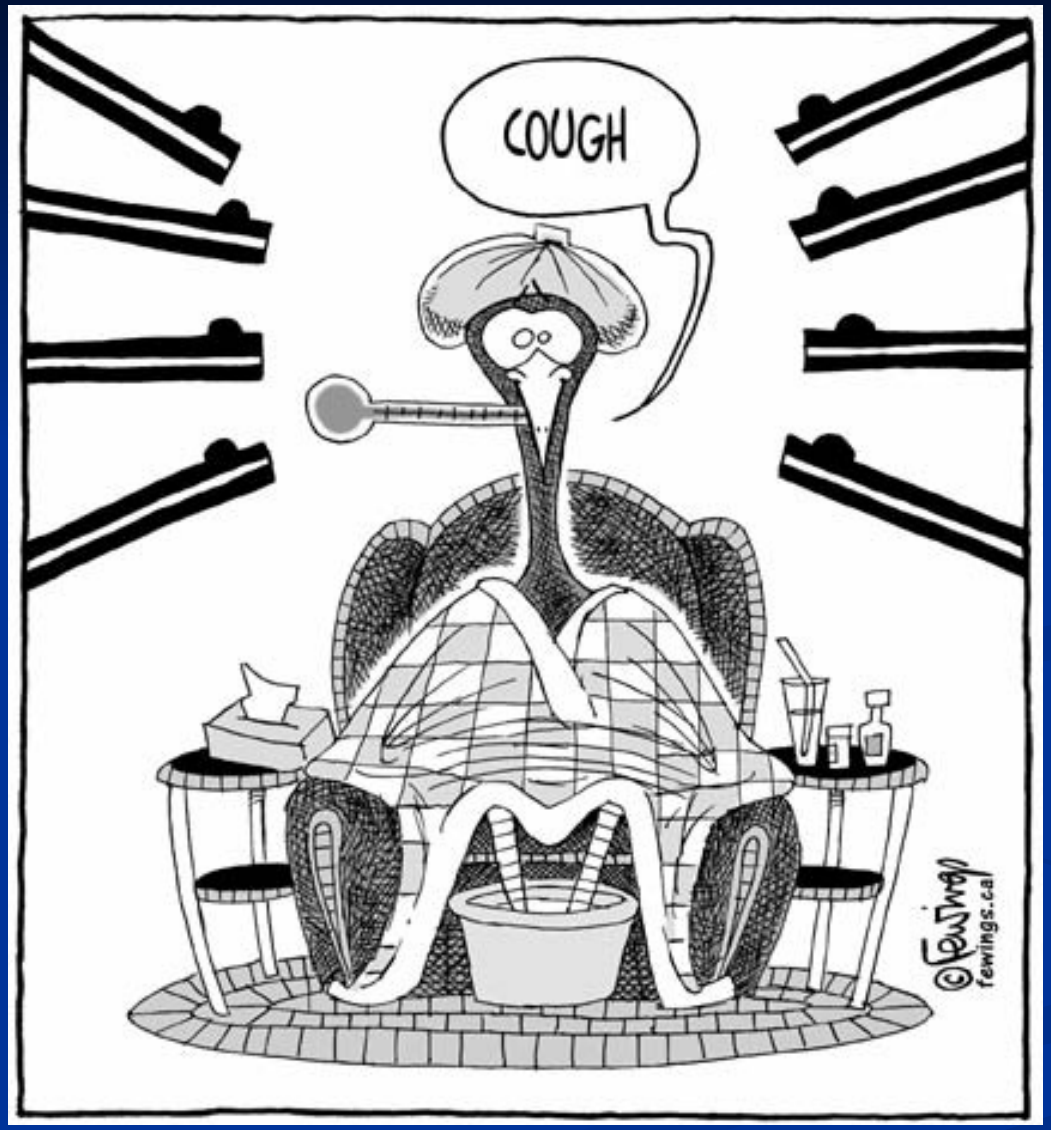
Fever with respiratory symptoms

- Differential diagnosis:
  - Influenza (Avian influenza?)
  - Typical and atypical pneumonia
  - Eosinophilic pneumonia
  - Tuberculosis
  - Typhoid fever
  - Malaria
  - Dengue
  - Q fever
  - Endemic fungi
  - Melioidosis

Fever with respiratory symptoms

- Evaluation:
  - CBC with differential
  - CXR
  - Blood and sputum cultures
  - Sputum AFBs
  - Malaria smears
- Initial therapy:
  - Ceftriaxone and azithromycin or a fluoroquinolone for pneumonia


COUGH
©Ewings
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Fever with neurologic symptoms

- Differential diagnosis
  - Bacterial
    - Meningococcal meningitis
    - Pneumococcal
    - Tuberculosis
    - etc
  - Spirochetal
    - Leptospirosis
  - Rickettsial
    - Any
  - Fungal
    - Coccidioidomycosis

Fever with neurologic symptoms

- Differential diagnosis
  - Viral
    - Enteroviruses (Coxsackie, echoviruses)
    - Dengue
    - Polio
    - Arboviral encephalitides
      - Japanese encephalitis
      - West Nile encephalitis
      - St Louis, Western Equine, Easter Equine, Colorado Tick…
    - Typhoid fever
    - HSV
    - Rabies
  - Parasitic
    - Malaria
    - Trypanosomiasis

Fever with neurologic symptoms

- Evaluation
  - CBC with differential
  - Blood cultures
  - Malaria smears
  - Lumbar puncture
    - Cell counts
    - Gram stain
    - Culture
  - Imaging if available

Fever with neurologic symptoms

- Initial therapy
  - Empiric therapy for bacterial meningitis
    - Vancomycin and ceftriaxone
  - Consider empiric therapy for rickettials
    - Doxycycline or tetracycline

Contracting West Nile Virus, I think is the least of my worries.
PK

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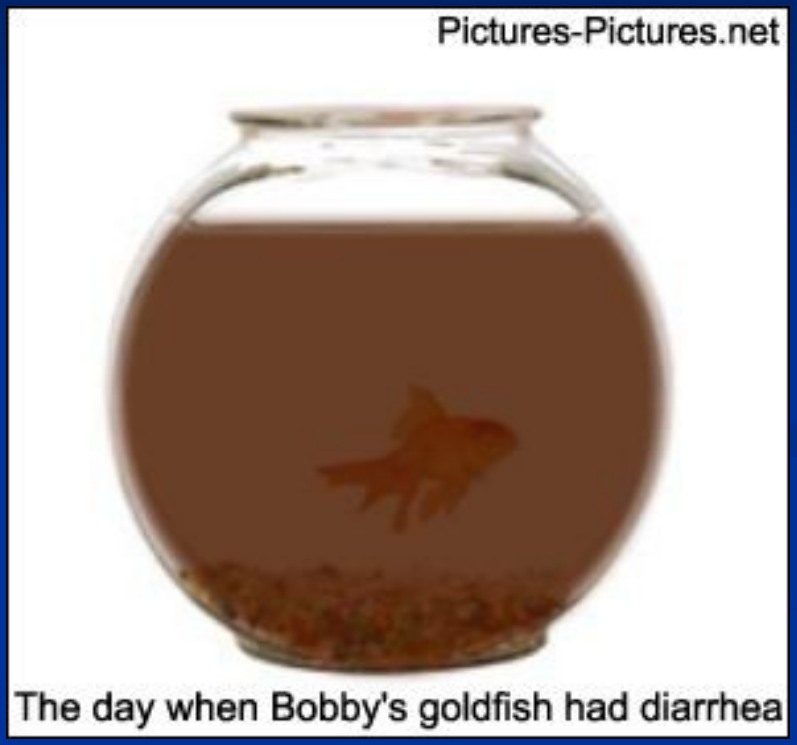
Fever with gastrointestinal symptoms

- Febrile dysentery usually indicates a enteroinvasive process

- Differential diagnosis
  - Enteroinvasive *E. coli*
  - Other causes of dysentery: other E. *coli, Salmonella, Shigella, Campylobacter, Entamoeba, Vibrio parahemolyticus*
  - Typhoid fever
  - Malaria
  - Leptospirosis
  - *C. difficile*

Fever with gastrointestinal symptoms

- Evaluation:
  - Stool for fecal leucocytes, guaiac, culture, O&P, C. diff toxin
  - Blood cultures
  - CBC with differential
  - Malaria smears
- Treatment:
  - For dysentery treat with fluoroquinolone (azithromycin in SE Asia) +/-- antimotility agent


Pictures-Pictures.net
The day when Bobby's goldfish had diarrhea

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Fever with eosinophilia

- Differential diagnosis
  - Acute hookworm, ascariasis, or strongyloides infection
  - Acute schistosomiasis (Katayama fever)
  - Visceral larva migrans (Toxocariasis)
  - Lymphatic filariasis (Elephantiasis)
  - Coccidioidomycosis

Fever with eosinophilia

- Evaluation
  - CBC with differential
  - Stool and urine for O&P
  - Serologies for parasitic infections
  - Blood smears or skin snips for microfilariae

muckraker@adelphia.net
DR. DRE
VET
(C) 2002: RICK LONDON / JOEL COUGHLIN
"I'D LIKE MY WORM
CHECKED FOR DOGS..."

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Undifferentiated Fever

- Differential diagnosis:
  - May be due to any of the previous etiologies (early in the course)
  - Commonly due to:
    - **Malaria**
    - Typhoid fever
    - Influenza
    - Dengue
    - Leptospirosis
    - Drug fever
    - Hepatitis A

Undifferentiated Fever

- Evaluation:
  - Observation and serial exams
  - CBC with differential
  - Chemistry/LFTs
  - UA, CXR
  - Blood and urine cultures
  - Malaria smears!

- If toxic, treat empirically for deadly diseases:
  - Ceftriaxone, doxycycline, mefloquine

FIGURE 11.—Antimalaria poster.

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Historical Experience

- Diagnoses of returning travelers with febrile illness, by region (%)

	All	Caribbean	Central America	South America	Sub-Saharan Africa	South Central Asia	Southeast Asia
Malaria	**35**	**7**	**13**	**13**	**62**	**14**	**13**
Dengue	**10**	**24**	**12**	**14**	**1**	**14**	**32**
EBV/CMV Mono	**3**	**7**	**7**	**8**	**1**	**2**	**3**
Rickettsial	**3**	**0**	**0**	**0**	**6**	**1**	**2**
Typhoid Fever	**3**	**2**	**3**	**2**	**1**	**14**	**3**
Other/ Unknown	**41**	**54**	**47**	**55**	**28**	**48**	**45**

• Freedman DO, Weld LH, Kozarsky PE, et al. Spectrum of disease and relation to place of exposure among ill returned travelers. N Eng J Med 2006. 354:119-130.

Historical Experience

- First Gulf War
  - Common infectious diseases encountered included:
    - Diarrhea predominantly ETEC and Shigella
    - Upper respiratory infections
    - Norovirus infections
  - Uncommon diagnoses:
    - Leishmaniasis
      - Cutaneous (20 cases)
      - Viscerotropic (12 cases)
    - Malaria (7 cases)
    - Q Fever (3 cases)
    - West Nile fever (1 case)

- Hyams KC, Riddle J, Trump DH, Graham JT. Epidemic infectious diseases and biological warfare during the Gulf War: A decade of analysis and final concerns. Am J Trop Med Hyg 2001. 65:664-670.

Historical Experience

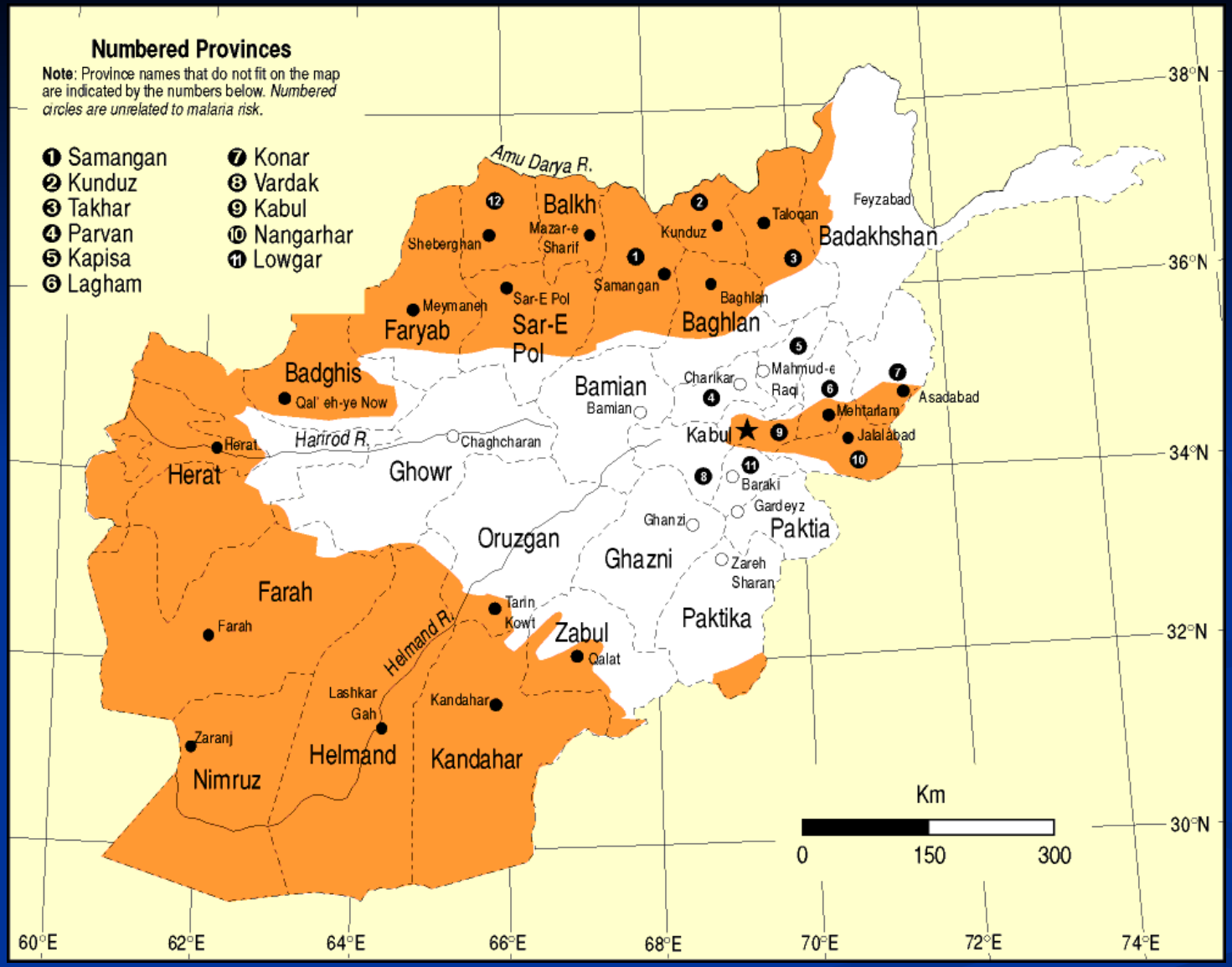
- Current Operations (OIF/OEF):
  - Percent of troops with at least one episode of illness during current operations:
    - Diarrhea
      - 77% in Iraq
      - 54% in Afghanistan
    - Febrile diarrhea
      - 25% overall
    - Respiratory illness
      - 69% overall

- Sanders JW, Putnam SD, Frankart C et al. Impact of illness and non-combat injury during Operations Iraqi Freedom and Enduring Freedom (Afghanistan). Am J Trop Med Hyg 2005. 73:713-719.

Historical Experience

- Cutaneous leishmaniasis (all due to *L. major*) was diagnosed in 827 persons through early 2005
- Visceral leishmaniasis confirmed in four patients
- Acute eosinophilic pneumonia occurred in 18 soldiers in Iraq
- 38 cases of malaria (*P. vivax*) occurred in a Ranger unit in Afghanistan
- Malaria has not been diagnosed in any American soldiers returning from Iraq

- Zapor MJ, Moran KA. Infectious diseases during wartime. Curr Opin Infect Dis 2005. 18:395-399.



Areas of Afghanistan where malaria occurs

- 90% *P. vivax*
- Occurs below 6500 feet April to December

From Travax EnCompass
downloaded 8 Feb 2006

Areas of Iraq where malaria may occur

- Exclusively *P. vivax*
- Occurs below 5000 feet May to November

From Travax EnCompass; downloaded 8 Feb 2006

Historical Experience

- Other infectious diseases which may occur in Afghanistan
  - Hepatitis A
  - Polio
  - Rabies
  - Typhoid fever
  - Tuberculosis
- Other infectious diseases which may occur in Iraq
  - Crimean-Congo Hemorrhagic Fever
  - Hepatitis A
  - Rabies
  - Typhoid fever
  - Tuberculosis
  - Schistosomiasis (southeast rivers)
  - Avian influenza (4 confirmed cases with 3 deaths)
  - Brucellosis

Historical Experience

- Review of 4831 patient encounters at an Echelon II facility in Iraq:
  - 74% DNBI
  - 19% dental
  - 7% WIA
- Breakdown of DNBI visits:
  - 13% URI
  - 2% febrile illness
  - 11% dermatologic illness
  - 4.7% diarrhea
  - 3.1% nausea/vomiting
  - 2 malaria cases (imported from Korea)
  - 24% hypertension!

- Murray CK, Reynolds JC, Schroeder JM, et al. Spectrum of care provided at an Echelon II medical unit during Operation Iraqi Freedom. Mil Med 2005. 170:516-520.

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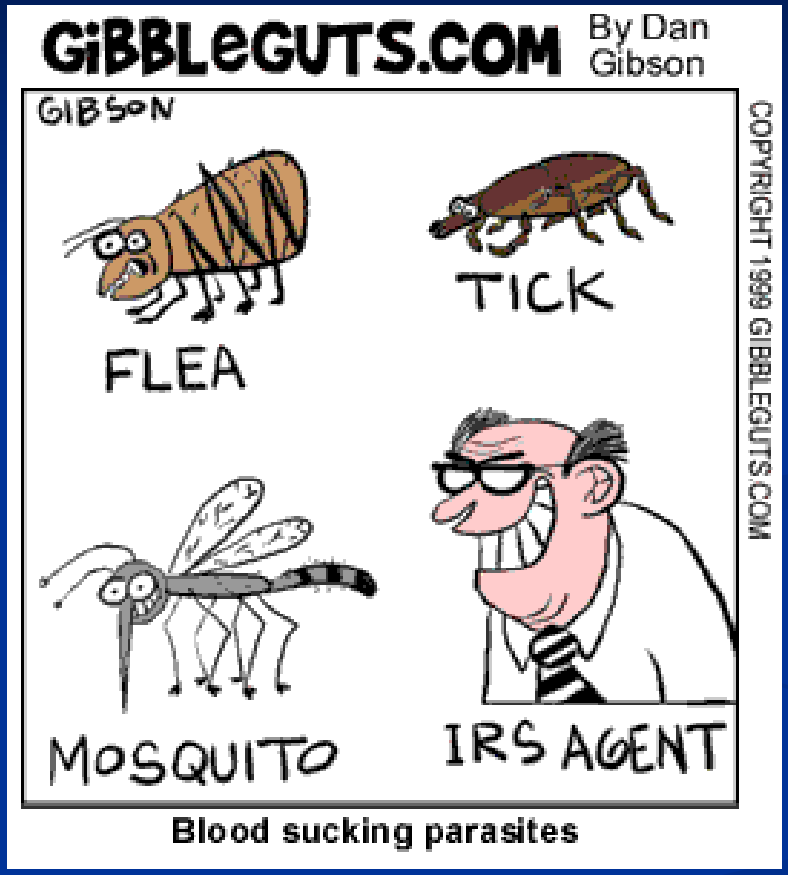
Conclusions

- A syndromic approach to fever allows you to narrow the differential
- Know your local epidemiology
- When in doubt, cover for meningococcemia, malaria, and rickettsial diseases
- Current theaters of operations have a limited spectrum of infectious disease thus far

Questions??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Blood sucking parasites